Data Structures and Algorithm
ITP Group Assignment I
Indian Institute of Information Technology, Allahabad
Electronics and Communication Engineering

Question- Write a C program to merge given a sorted and rotated array, find if there is a pair with a given sum.

I. INTRODUCTION

We are given a sorted and rotated array and then we have to merge it and after that the problem is to check that whether there exists a pair with a given sum or not in merged array. So in this assignment we are trying to find the solution of this query.

II. ALGORITHM DESIGN

As we are given sorted and rotated arrays **a[m**]and **b[n]** to merge to form some array **c[s]** (where,**s=m+n**) and then we are required to find the pairs formed from the element of **c[s]** array such that their sum is equal to some given integer **k**. To do so we have to divide the problem statement in following different parts:

- Merging the array
- Sorting the merged array
- Finding the given sum pairs

A) Merging the array: To merge the given array we have to create a third array of length equal to the sum of given two and then we have to store the other two array's element in the new array. We have to take input of first array from user and then we need to assign those elements to the corresponding index of **c[s]**. Till now we have been able to store m element of first array a[m] and now to store element from (m-1) th index to (m+n-1) th So, we have to take input of elements of b[n], and assigned tth index of b[m] to (m +t) th of index of c[s]. So, in this way, we can the merged array c[s] (unsorted).

```
for (int i=0; i<m; i++)
        {  scanf("%d",&a[i]);
              c[i]=a[i];    }
           int k=m;
    for(int i=0;i<n;i++)
        { scanf("%d",&b[i]);
             c[b[i];
             k++;  }
```

B) Sorting merged array: The array after merging may and may not be sorted so we are now required to sort the array c[s]. To sort the array c[s] first we will be considering 0th index element and comparing that with index greater than 0 and whenever we find element which is less than 0th index element we swap them and this process of comparison will go till (s-1) th index. Similarly, this process of swapping and comparison will be done for 1st 2nd …..till(s-2) th. Now we will be having sorted array.

```
for (int i=0;i<s;i++)
    {  int temp;
       for(int j=i+1;j<s;j++) {
          if(c[i]>c[j]) {
                temp=c[i];
                c[i]=c[j];
                c[j]=temp; }
              }     }
```

C) Finding the given sum Pair: To find pair having sum p, we first select 0th index element and then perform linear search between 0 th<y< n th index to find **c[0]+ c[y]=p**, similarly we have

to try, to find this condition true for 1st 2nd ……..till (s-1) th index. For x th index we will be searching its pair from (x+1) th index to (s-1) th.

```
for(int x=0;x<s;x++){
for(int y=x+1;y<s;y++) {

if(c[x]+c[y]==p){
printf("[%d,%d]"" ",c[x],c[y]); }

                    }          }
```

III. CONCLUSION

The above design algorithm is of merging sorted and rotated array works perfectly and also the algorithm to find pairs having sum k give us the desired pairs(x,y).

IV.REFERENCES

Here are some references which we used to solve the problem:

1.https://www.geeksforgeeks.org/c-program-for-given-a-sorted-and-rotated-array-find-if-there-is-a-pair-with-a-given-sum/

2. https://www.geeksforgeeks.org/search-an-element-in-a-sorted-and-pivoted-array/

3.https://www.tutorialspoint.com/check-if-an-array-is-sorted-and-rotated-in-cpluspluS

V. Code

```
#include <stdio.h>
 int main(){
   //Array Size Declaration
   int m,n,s,p,NOP=0;

printf("Enter size of 1st & 2nd array:\n");
scanf("%d %d",&m,&n);
printf("\n");

printf("Enter sum you want to search:\n");
scanf("%d",&p);

   s=m+n;
   int a[m],b[n],c[s];

   //Inputting arrays and merging them.

for(int i=0;i<m;i++)
  {
scanf("%d",&a[i]);
    c[i]=a[i];
  }
  int k=m;
for(int i=0;i<n;i++)
  {
scanf("%d",&b[i]);
    c[k]=b[i];
    k++;
  }

printf("\nThe merged array..\n");
for(int i=0;i<s;i++){
printf("%d "" ",c[i]);
  }
printf("\n");

for(int i=0;i<s;i++)
  {
    int temp;
for(int j=i+1;j<s;j++)
    {
      if(c[i]>c[j])
      {
        temp=c[i];
        c[i]=c[j];
        c[j]=temp;
      }
    }
  }
printf("\n");
printf("\nAfter sorting...\n");
for(int i=0 ;i<s; i++)
  {
printf("%d "" ",c[i]);
  }
printf("\n");

for(int x=0;x<s;x++){
for(int y=x+1;y<s;y++){
      if(c[x]+c[y]==p){
printf("[%d,%d]"" ",c[x],c[y]);
        NOP++;
      }
    }
  }
if(NOP!=0)
printf("--->Pairs with given sum");
  else
printf("There exists no such pair.");
    return 0;
          }
```

Submitted by:

IEC2021079 (VEDANT BORKAR)
IEC2021080 (Nallabothula Pooja)
IEC2021081 (ASHUTOSH SHAH)
IEC2021082 (NEHA MEENA)